May 19, 1970 M. MURRAY ET AL 3,513,347

PREFOCUSED FILAMENT-MOUNT STRUCTURE FOR SEALED-BEAM TYPE INCANDESCENT LAMP AND METHOD OF MANUFACTURE

Filed Aug. 24, 1967 2 Sheets-Sheet 1

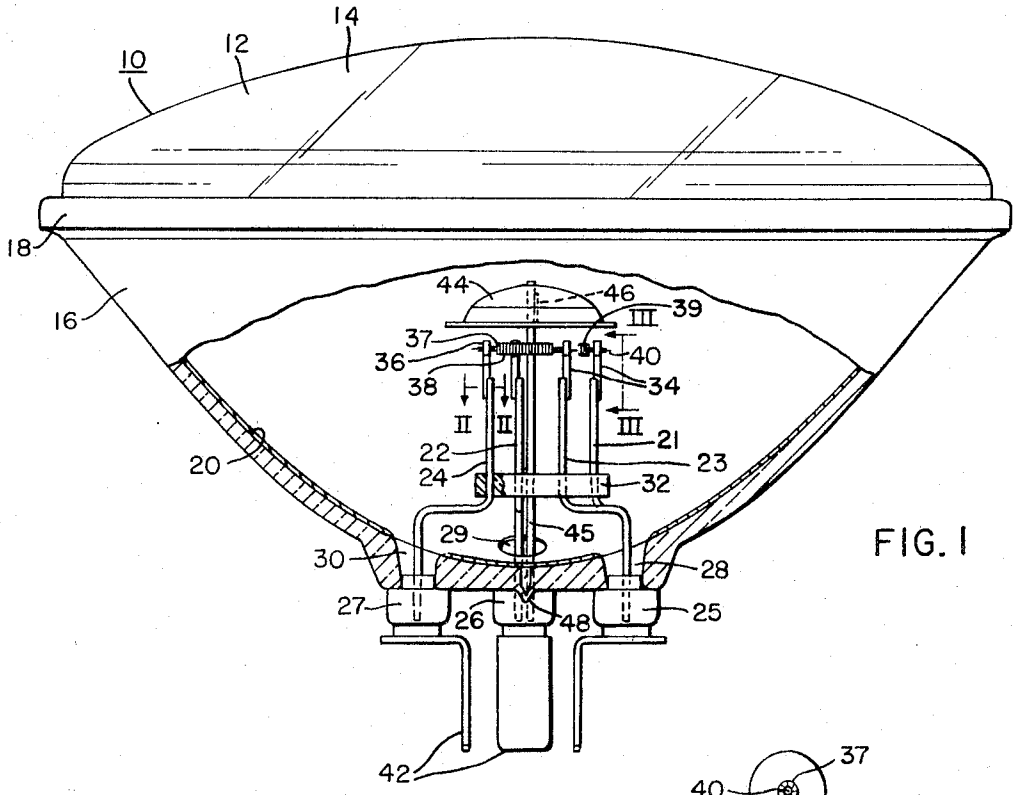


FIG. 1

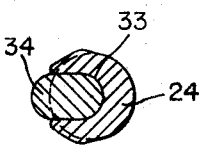


FIG. 2

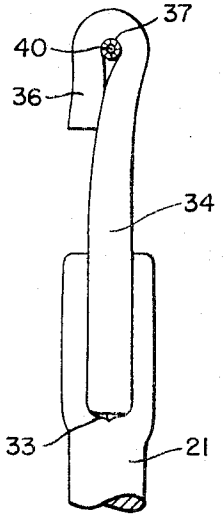


FIG. 3

WITNESSES

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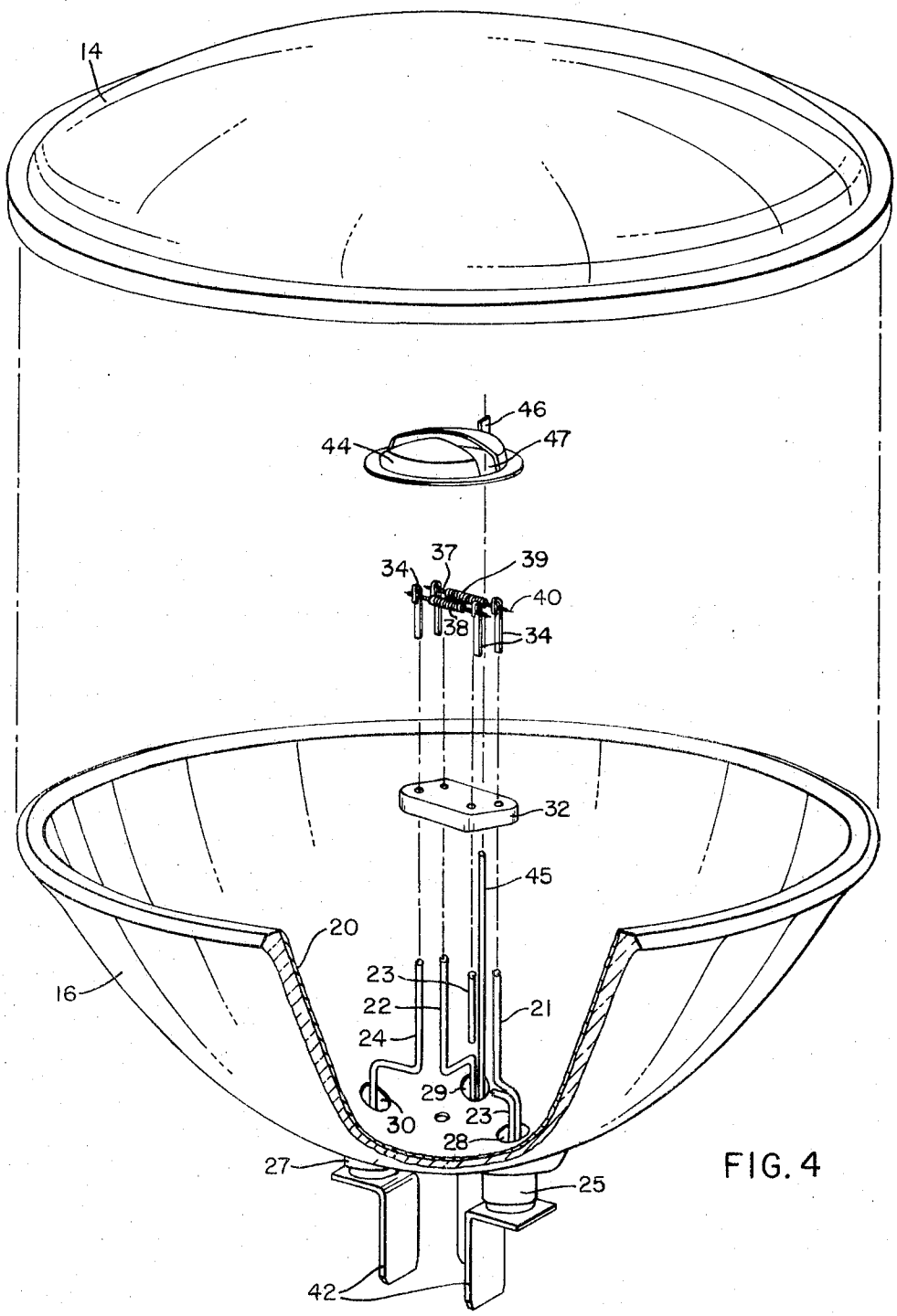


FIG. 4

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PREFOCUSED FILAMENT-MOUNT STRUCTURE FOR SEALED-BEAM TYPE INCANDESCENT LAMP AND METHOD OF MANUFACTURE

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U.S. Cl. 313—115 7 Claims

ABSTRACT OF THE DISCLOSURE

A coiled-coil filament is supported in prefocused relationship with the glass reflector component of the envelope by rigid stub-like connector leads of predetermined length that are seated in notches formed in the ends of the lead wires, and the latter are held in proper orientation by an apertured force-fitted ceramic insulator. The connector-leads are clamped to the ends of the filament coil to form a separate subassembly that is mounted on and spot welded to the trimmed and notched ends of the lead wires of a conventional reflector-lead assembly after the insulator is threaded over and anchored to said wires.

BACKGROUND OF THE INVENTION

This invention relates to electric incandescent lamps and has particular reference to an improved prefocused filament-mount structure for sealed-beam type reflector lamps and to a method of manufacturing such mounts and assembling them with the reflector component of the lamp envelope.

Certain types of commercial vehicles such as buses etc. now in use are equipped with air conditioning apparatus which requires an electrical system having a nominal rating of 24 volts. Since it would be impractical to equip such vehicles with a separate electrical system that would accommodate conventional 12 volt sealed-beam headlamps, special sealed-beam lamps having a nominal rating of 24 volts have been developed for this application. Because of this higher operating voltage coiled-coil type filaments have to be employed in contrast to the singly-coiled filaments used in conventional sealed-beam headlamps. This, in turn, necessitated clamping the coil legs to preformed hooked lead wires instead of automatically crimping them in the notched lead wires as in the case of conventional lamps having singly-coiled filaments. The coiled-coils, accordingly, could not be oriented and fastened to the lead wires in the desired prefocused position on the automatic mounting machines used to manufacture standard lamps.

In the case of dual-filament 24 volt lamps, it was accordingly the prior art practice to load four prebent lead wires having hooked ends in a jig, along with a support wire for the filament shield, and then weld two glass bridges to the leads to form a unitary assembly. The filaments were then clamped in the lead wire hooks and the resulting mount structure hand loaded into a reflector and the leads brazed to the hollow metal ferrules sealed into the back of the reflector. These operations were not only tedious and time consuming but made it very difficult to locate the mount within the reflector with the required degree of accuracy. As a result, the manufacturing cost of these lamps was much higher as compared to standard lamps.

SUMMARY OF THE INVENTION

It is accordingly the general object of the present invention to provide a sealed-beam type electric lamp having an improved filament-mount structure that overcomes the

foregoing and other problems associated with the use of coiled-coil filaments in such lamps.

A more specific object is the provision of a mount for a dual-filament sealed-beam vehicle lamp that is adapted for operation on a 24 volt electrical system and which can be fabricated with a minimum amount of labor and a minimum number of parts.

Another object is the provision of a method for mounting a filament in prefocused relationship with a sealed-beam lamp reflector without the use of complex and expensive automatic filament-positioning equipment.

The foregoing objects and other advantages are achieved in accordance with the present invention by utilizing reflector-ferrule assemblies of the type used for conventional sealed-beam lamps wherein the rigid lead wires are automatically brazed to the ferrules and are prebent to accommodate the filament coils. The protruding ends of the lead wires are trimmed to a predetermined length and provided with grooves or notches that extend a predetermined distance axially from the ends of the leads. A separate subassembly consisting of two short stub or connector leads that are clamped to the legs of the coiled-coil filament is mounted on the notched lead wires by seating the ends of the connector-leads in the notches and welding the members together. The filament is thus accurately located with respect to the reflector and securely fastened to the lead wires. The latter are held in the proper spaced-apart position during the filament-mounting and welding operations by an apertured ceramic insulator that is threaded over the wires before the connector-leads are inserted into the notches.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the invention will be obtained by referring to the accompanying drawings, wherein:

FIG. 1 is a side elevational view of a dual-filament sealed-beam vehicle lamp embodying the improved mount structure of the present invention, portions of the lamp envelope being removed and shown in cross-section for convenience of illustration;

FIG. 2 is an enlarged cross-sectional view through the welded juncture of one of the connector-leads and notched lead wires, taken along the line II—II of FIG. 1;

FIG. 3 is an enlarged side elevational view of one of the connector-leads and joined portion of the lead wire as viewed along the line III—III of FIG. 1; and,

FIG. 4 is an exploded perspective view of the filament-mount subassembly and other components used in the lamp shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 there is shown a dual-filament sealed-beam headlamp **10** having an envelope **12** consisting of a light transmitting lens portion **14** and a reflector portion **16** of vitreous material that are fused together at their peripheries in the usual manner, thus forming a circumferential sealed flange or bead **18**. The reflector **16** is of parabolic configuration and is interiorly coated with a layer **20** of reflective material such as aluminum or the like. Two pairs of lead-in conductors such as rigid wires **21–22** and **23–24** are brazed to the inner surfaces of hollow metal ferrules **25, 26** and **27** that are hermetically sealed into triangular-spaced openings **28, 29, 30** provided in the back of the reflector.

As is illustrated more clearly in FIG. 4, two of the lead wires (the wires **21** and **23** as here shown) are attached to the same ferrule **25** which thus serves as a common terminal for the lamp **10**. Intermediate portions of each of the lead wires **21–24** are bent inwardly toward one another and the axis of the reflector **16** so that the straight

inner ends of the wires are arranged in parallel spaced relationship with respect to one another and the axis of the lamp **10**. The lead wires **21–24** are held in the aforesaid position by an apertured ceramic insulator **32** that is seated against the bent portions of the wires and frictionally interlocked in spanning relationship with the engaged parts of the leads.

As is shown more particularly in FIGS. 2 and 3, the inner ends of each of the lead wires **21–24** are provided with longitudinal recesses such as notches **33** that are of generally U-shaped cross-section and extend axially from the ends of the respective wires for a predetermined distance along the laterally disposed faces thereof. A short stub or conductor-lead **34** of stiff nickel wire or the like is inserted into each of the notches **33** and is welded to the contiguous portions of the respective lead wires **21–24**. The opposite ends of the connector-leads **34** are formed into hooks **36** that are clamped around the longitudinally-extending singly-coiled leg portions **37** of a pair of linear coiled-coil filaments **38** and **39** of tungsten or other suitable refractory material. An insert **40** of molybdenum wire or the like is slipped into each of the coil legs **37** to prevent the latter from being crushed by the hooks **36**.

The connector-leads **34** are of predetermined length and seated against the bottoms of the respective notches **33** (as shown in FIG. 3) so that filaments **38** and **39** are held in parallel spaced relationship and the desired prefocused orientation relative to the focal point of the reflector **16**. The filaments can be selectively energized in the usual manner by connecting the proper pair of ferrules **25–27** to the vehicle's electrical system. Blade-like contactors such as lugs **42** are brazed to the ends of the ferrules for this purpose.

An apertured shield **44** of suitable metal is mounted in front of the filaments **38** and **39** by a support wire **45** that is welded to a tab **46** coined from the rim of the shield and has its opposite end brazed to the ferrule **26**. The shield aperture **47** (shown in FIG. 4) is elongated and so oriented with respect to the filaments **38** and **39** that glare-producing light rays are minimized when the lamp **10** is mounted on the vehicle and energized. The support wire **45** is straight and thus does not pass through the insulator **32**. However, the latter could be enlarged to accommodate this wire also, particularly if the lamp is subjected to severe vibrations or shock when in use.

The filaments **38** and **39** in the particular embodiment shown are both of the coiled-coil type and each have nominal ratings of 50 watts and 24 volts. Of course, coiled-coil filaments having different wattage and voltage ratings can also be used.

FILAMENT MOUNTING OPERATION

In accordance with the present invention, the manufacturing cost of the lamp **10** is minimized by utilizing standard reflector assemblies of the type used in the manufacture of conventional sealed-beam lamps. These assemblies are fabricated on automatic equipment and, as shown in FIG. 4, consist of the reflector component **16**, the sealed-in ferrules **25–27** and attached lugs **42**, and the brazed lead wires **21–24** and the support wire **45**. This assembly is loaded into a modified automatic mounting machine that trims the ends of the lead wires **21–24** and support wire **45** to the proper length and then notches the lead wires. The ceramic insulator **32** is then threaded over the trimmed ends of the lead wires and seated against and frictionally interlocked with the bent intermediate portions of the wires.

The separately fabricated mount assemblies consisting of the coiled-coil filaments **38** and **39** and their respective clamped depending connector-leads **34** are then attached to the notched ends of the respective pairs of lead wires **21–22** and **23–24** by inserting the connector leads into the notches, seating them therein and spot welding together the overlapping end portions of the wires and leads. The filament shield **44** (if one is used) is then positioned in the front of the filaments and the tab **46** is spot welded to the support wire **45**.

The lens **14** is then placed over the reflector **16** and they are sealed together in the usual fashion. The envelope **12** thus formed is evacuated through a vitreous exhaust tube sealed into the back of the reflector **16**, the envelope is filled with a suitable inert gas such as a mixture of argon and nitrogen and the exhaust tube tipped off in accordance with standard lamp-making practice to form a seal-tip **48** (see FIG. 1), thus completing the fabrication of the lamp **10**.

It will be appreciated from the foregoing that the objects of the invention have been achieved in that a novel and inexpensive structure and method have been provided for mounting a pair of coiled-coil filaments in precise prefocused relationship with the reflector of a sealed-beam type vehicle lamp. The operations required to form and assemblies the various components are simple in nature and can readily be performed by automated equipment using reflector-lead assemblies of the kind used for conventional sealed-beam lamps. The elimination of the hand-mounting and brazing operations and the two glass bridges and associated welding operations heretofore required has not only drastically reduced the manufacturing cost of such high-voltage sealed beam lamps but has improved the lamp quality, particularly with respect to the precision of the prefocusing operation.

While a preferred embodiment of the mount structure and prefocusing method have been illustrated and described, it will be appreciated that various changes in the construction and mode of assembly can be made without departing from the spirit and scope of the invention.

We claim as our invention:

1. In a sealed-beam type incandescent lamp having an envelope with a concave reflector portion that has a focal point and a pair of exposed electrical terminals, the improvement comprising the combination of:

a pair of spaced rigid lead-in wires of predetermined length connected to said terminals and extending therefrom into said envelope, the inner ends of each of said lead-in wires being substantially straight and having an elongated recess therein that extends a predetermined distance along a side of the wire from the end thereof,

a linear coiled-coil filament of refractory wire that is terminated at each end by a longitudinally-extending leg portion and is disposed in predetermined spatial relationship with the focal point of the concave reflector portion of said envelope, and

means supporting said filament in such position comprising a pair of rigid stub-like connector-leads of predetermined length that are attached to the leg portions of said filament and extend transversely therefrom and have their opposite ends seated in the respective recesses in abutting relation with the bottoms thereof and fastened to the contiguous portions of said lead-in wires, said conjoined connector-leads and lead-in wires comprising the sole support means for said filament.

2. The combination set forth in claim **1** wherein the lead-in wires are held in predetermined spaced-apart relationship by an apertured insulator that spans and is frictionally interlocked with bent intermediate portions of said lead-in wires that extend laterally toward the sides of said concave reflector portion.

3. The combination set forth in claim **1** wherein:

said concave reflector portion comprises a vitreous member of parabolic configuration that is interiorly coated with a layer of reflective material and is hermetically sealed to a vitreous lens portion,

said terminals comprise a pair of hollow metal ferrules that are sealed into spaced openings in the back of said vitreous reflector portion,

said coiled-coil filament comprises a tungsten filament having singly-coiled leg portions,

said lead-in wires extend through the openings in said reflector portion and have bent intermediate segments which extend laterally toward the lamp axis and are of such configuration that the inner ends of said wires extend substantially parallel to the lamp axis and are spaced a predetermined distance apart,

said lead-in wires are held in such position by an apertured ceramic insulator that spans and is anchored to the inner ends of said lead-in wires and is seated against the bent intermediate segments thereof,

the recesses in the ends of said lead-in wires comprise notches that are of generally U-shaped cross-section and located on the laterally disposed faces of the respective wires, and

said stub-like connector-leads comprise substantially straight pieces of stiff wire that are nestingly seated in said notches and joined to said lead-in wires by welds.

4. The combination set forth in claim **3** wherein said linear coiled-coil filament is disposed at approximately the focal point of the reflectorized parabolic member and has a nominal rating of 50 watts and 24 volts.

5. The combination set forth in claim **5** wherein:

a third ferrule is sealed into a third opening in the back of said parabolic reflector member,

a third lead-in wire is fastened to said third ferrule and extends through said third opening into parallel spaced relationship with the inner ends of said pair of lead-in wires,

a fourth lead-in wire is attached to one of said pair of ferrules and extends through the associated opening into the reflector member in parallel spaced relationship with the inner ends of the other lead-in wires,

the inner ends of said third and fourth lead-in wires have U-shaped notches therein,

said ceramic insulator spans and is also anchored to said third and fourth lead-in wires,

a second linear coiled-coil tungsten filament is fastened to the inner ends of said third and fourth lead-in wires by stub-like connector-wires that are seated in and welded to the notched ends of said third and fourth lead-in wires, and

said lead-in and connector wires are of such configuration and length that the coiled-coil filaments are disposed in parallel spaced relationship and prefocused orientation relative to the focal point of said parabolic reflector member.

6. In the manufacture of a sealed-beam type incandescent lamp having a concave vitreous reflector that consitutes part of the lamp envelope and has a plurality of external hollow metal terminals that are sealed into spaced

openings in said vitreous reflector, the method of mounting a linear coiled-coil filament having longitudinally-extending legs and orienting said filament in prefocused relationship with said reflector comprising the steps of:

fastening a pair of stub-like connector-leads of predetermined length to the longitudinally-extending legs of said filament to form a filament-lead subassembly wherein the connector-leads depend transversely from the coiled-coil filament in a predetermined spatial relationship,

fastening a pair of prebent rigid lead-in wires having laterally-extending intermediate portions to the inner walls of the respective metal terminals so that the free inner ends of said lead-in wires are disposed in the same spatial relationship as the transversely depending connector-leads,

trimming the free ends of said lead-in wires to a predetermined length,

forming longitudinally extending recesses of predetermined length in each of the trimmed ends of said lead-in wires,

placing the depending end portions of said connector-leads in the respective recesses in said lead-in wires and seating said end portions against the bottom of the respective recesses so that the coiled-coil filament is disposed in the desired prefocused position relative to said reflector, and then

fastening the ends of said connector-leads to the recessed end portions of said lead-in wires.

7. The method set forth in claim **6** wherein:

a preformed insulator having spaced apertures therein arranged to accommodate the protruding trimmed ends of said lead-in wires is threaded over the latter and frictionally interlocked with the bent portions thereof before the placement of said filament-lead subassembly on the ends of said lead-in wires, and

the connector-leads are fastened to said lead-in wires by welding together the overlapping portions thereof.

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29—25.15; 313—272